

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

After entry of the foregoing amendment, Claim 3 is pending in the present application. Claim 3 is amended without introduction of new matter; and Claims 1, 2, and 4-16 are canceled without prejudice or disclaimer.

In the outstanding Office Action, Claims 1, 2, and 4 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,528,870 to Fukatsu et al (hereinafter “Fukatsu”); and Claim 3 was rejected under 35 U.S.C. § 103(a) as unpatentable over Fukatsu in view of U.S. Patent No. 6,051,093 to Tsukahara.

Addressing now the rejections of Claims 1-4 under 35 U.S.C. § 102(e) and § 103(a) as anticipated by or unpatentable over Fukatsu, those rejections are moot with respect to Claims 1, 2, and 4 in view of the cancellation of those claims; and those rejections are traversed with respect to Claim 3, which is amended to recite subject matter of canceled Claim 4.

Amended Claim 3 is directed to a method for manufacturing a circuit device. The method includes:

mounting a plurality of electronic components on an insulation layer, the insulation layer stacked on a wiring layer of a wiring substrate, the electronic components each including an element to perform an electrical function and each having a bump electrode on one side and a pad electrode on the other side in such a manner that the bump electrode is buried into the insulation layer, the bump electrodes of the electronic components having substantially same height;

pressing the pad electrode of each of the mounted electronic components with a heater tool having a planar pressing face to pattern a surface of the insulation layer after the pressing face, and pressing the electronic components into the insulation layer until the pad electrode reaches the surface of the insulation layer to mechanically bond the electronic components and the wiring layer together at the bump electrodes and then harden the insulation layer; and

electrically bonding another component to at least part of the pad electrodes pressed by the heater tool.

Support for amended Claim 3 may be found within the claims as originally filed and within the following non-limiting explanation of the claimed invention.

In a non-limiting example, Figures 4C-4E illustrate a substrate to which components have been affixed via an embodiment of the claimed method. As shown in Figure 4C, electronic components 45 and wiring components 48 are provisionally affixed to an insulative resin layer 43. As shown in Figure 4D, the components 45, 48 are then pressed by a heated press head 49 into the insulative layer 43. The thermal pressure brings the bump electrodes 46, 402 of the pressed electronic components 45 and wiring components 48 into contact with electrodes of the underlying first wiring layer 41. As a result, bump electrodes 46 and corresponding electrodes of the first wiring layer 41 may be fused together to form a junction.¹ The polymerization reaction of the insulative resin layer 43 may reach almost 100% completion. As shown in Figure 4E, when the thermal pressing is completed, a component-containing circuit having a flat upper surface in the pattern of the press head 49 can be achieved. The above steps may be repeated to form a component-containing circuit device having a given number of layers, in which electrodes of components of the overlying layers contact pad electrodes of components of the underlying layers.²

The outstanding Office Action cites Fukatsu as teaching features of Claims 1-4, except for citing Tsukahara as teaching the pressing of the electronic components into an insulation layer. As motivation for the proposed combination, the Office Action states it would have been obvious to one skilled in the art to modify Fukatsu's apparatus to include Tsukahara's adhesive layer, in order to protect the active surface of the mounted electronic

¹ Specification, page 27, line 6 – page 28, line 26.

² Specification, page 28, line 26 – page 29, line 2.

components and electrodes; and in order to increase the reliability of connection when a mounting tool (e.g., suction nozzle) applies heat and pressure.³

The combination of Fukatsu and Tsukahara does not teach at least several of the features of amended Claim 3. For instance, the proposed combination does not teach at least the features of pressing a plurality of electronic components into an insulation layer until the pad electrodes (arranged on a different side than the electrode bumps) of those components reach the surface of the insulation layer; and does not teach patterning the surface of such an insulation layer with a planar pressing face. As a result, the combination of Fukatsu and Tsukahara does not teach a method of forming a multi-layered component-containing substrate that combines a plurality of electronic components with the substrate.

Applicant further notes that the stated motivation for combining Fukatsu and Tsukahara is improper. Tsukahara's adhesive sheet 21 is used in conjunction with protruding bumps 15 and vias of conductive paste 7 to increase the reliability of connection. Placing Tsukahara's adhesive sheet 21 between of Fukatsu's terminal section 33 and wiring substrate 43, even if concurrently using of Tsukahara's protruding bumps 15 and vias of conductive paste 7, would interfere with the flow of solder 44 through the holes 34a of the closely contacted four electrodes 34.⁴ There is also no indication that placing an insulative layer between Fukatsu's terminals 33 and wiring substrate 43 would protect the active surface of the semiconductor chips 36, which is arranged away from the terminals 33.

Accordingly, for the reasons stated above, Applicant respectfully requests the rejection of Claim 3 under 35 U.S.C. § 103(a) as unpatentable over Fukatsu in view of Tsukahara be withdrawn. Further, Applicant respectfully submits that the rejection of Claims 1, 2, and 4 as anticipated by Fukatsu is inapplicable to amended Claim 3.

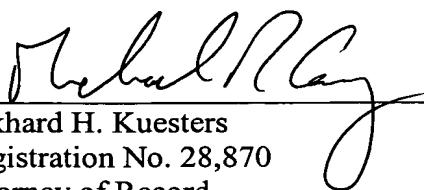
³ Office Action, July 1, 2004, page 5; citing Tsukahara, Figures 14A to 14C and column 8, line 61 to column 9, line 5.

⁴ Fukatsu, col. 6, lines 61-64.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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